## FIRST RECORD OF BLUEFISH LARVAE, *Pomatomus saltatrix*, IN THE GULF OF MEXICO[1]

The bluefish, *Pomatomus saltatrix*, is an important sport and commercial fish in the United States. In 1970, the latest year for which sport and commercial data are published, 1.4 million anglers caught 5,480 metric tons of bluefish in United States waters, making this fish first by weight of all species that were caught by anglers (Deuel 1973). About 59,000 bluefish anglers in the Gulf of Mexico caught 785 metric tons in 1970 (Deuel 1973). Commercial bluefish landings for 1970 were 3,000 metric tons, of which 315 metric tons were caught in the Gulf (Wilk 1977).

The bluefish is a migratory pelagic species. In U. S. waters it is found only in the Atlantic and the Gulf. It is present only during a short period of the year along the eastern U. S. (Wilk 1977). Spawning and migrational patterns of bluefish have been described from the waters off the eastern United States (Norcross *et al.* 1974; Kendall 1978), but the literature contains little on migration and nothing on the occurrence of bluefish larvae in the Gulf. The first records of bluefish larvae in the Gulf are presented here and data on spawning are discussed.

### MATERIALS AND METHODS

Sampling followed standard Marine Resources Monitoring, Assessment, and Prediction (MARMAP) procedures (Jossi *et al.* 1975). Plankton samples were obtained with a 61-cm bongo frame with 0.333-mm and 0.505-mm mesh nets. A digital direct-reading flowmeter was attached inside the mouth of each net to determine the amount of water strained by the net. Timed double-oblique tows were made from the surface to near the bottom at each station. Ten-minute neuston surface tows using a 0.505-mm mesh net, and STD casts were taken at each station by scientists from Texas A&M University on separate hydrographic cruises using the same transects and stations that we used.

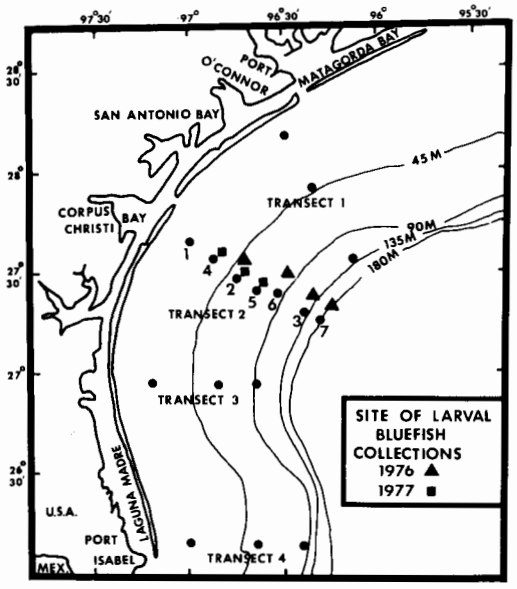


**Figure 1.** Sampling area off south Texas coast, indicating sites of larval bluefish collections.

Sampling locations for this study covered an area off the Texas coast from Port O'Connor to Port Isabel (Figure 1). Nine monthly sampling cruises were conducted during each of 1976 and 1977 except that the first cruise each year was in late January - early February, and there were no cruises in June or October. The first, fourth, and seventh cruises each year covered all four transects. Plankton samples were taken only along Transect 2 during the remaining cruises.

Ichthyoplankton was sorted from the entire bongo sample and from aliquots of neuston samples prior to their id-

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entification. Samples were initially preserved in 10% Formalin, and all fishes were later transferred to 5% Formalin in buffered seawater. Fish larvae were measured to the nearest 0.1-mm standard length (SL) using a dissecting microscope with an ocular micrometer. Identifications of bluefish larvae were verified by Dr. Arthur W. Kendall, Jr., NMFS, Sandy Hook Laboratory, Highlands, N.J.

## RESULTS

Only 18 bluefish larvae were captured. They were taken only during November and no bluefish larvae were found in the neuston. Bluefish larvae were not collected from the most inshore station, and only one larva was collected in water less than 49 m deep (Table 1). In 1976, bluefish larvae (median SL - 4.8 mm) were collected from Stations 2, 3, 6, and 7 along Transect 2, the only transect sampled in November. Mean temperature and salinity for the surface waters from those stations where bluefish were collected were 23.9 C and 36.1°/∞. In 1977, bluefish larvae (median SL = 3.7 mm) were collected from Stations 2, 4, and 5 along Transect 2. Mean surface temperature and salinity at stations where bluefish larvae were taken were 25.7C and 36.1°/∞. The mean number of bluefish larvae under 10 $m^2$ of surface water at stations where bluefish larvae were collected was 2.5 in 1976 and 5.4 in 1977.

## DISCUSSION

Bluefish appear to spawn over, or seaward of, the continental shelf in the Gulf as they do in waters off the eastern U. S. Spawning probably occurred at least 3 to 6 days before collection based on the similarity of the lengths of larvae we collected and the lengths of developing bluefish larvae (Deuel *et al.* 1966). Most of the bluefish larvae taken off the southeastern United States were captured in the upper portion of the water column (Powles & Stender 1976) . Winds and surface currents off Texas during November (Sweet 1974; Angelovic 1976) could have carried some of the larvae inshore into the sampling locations. The temperature and salinities in our area of collection were above the minimums of 18.0 C and 26.6°/∞ given for bluefish spawning off the east coast

Table 1. Data from Transect II (see text) for November 1976 and 1977, indicating occurrence of bluefish (*Pomatomus saltatrix*) larvae.

| Date | Transect/ Sta. | Time of tow (CST) | No. of bluefish larvae | Standard length (mm) | Station depth (m) | Maximum tow depth (m) | Surface Temp. (°C) | Surface salinity (°/∞) | Water filtered ($m^3$) | No. fish under 10 $m^2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 11/10/76 | II-1 | 1040 | 0 | ---- | 22 | 17 | 20.8 | 31.8 | 153.2 | ---- |
| 11/10/76 | II-4 | 0930 | 0 | ---- | 34 | 29 | 20.8 | 33.2 | 189.3 | ---- |
| 11/9/76 | II-2 | 1950 | 1 | 3.9 | 49 | 44 | 23.2 | 35.7 | 255.0 | 1.9 |
| 11/9/76 | II-5 | 1858 | 0 | ---- | 78 | 73 | 24.0 | 36.2 | 523.4 | ---- |
| 11/9/76 | II-6 | 1101 | 1 | 4.8 | 98 | 93 | 24.1 | 36.2 | 548.0 | 1.8 |
| 11/9/76 | II-3 | 1335 | 1 | 5.0 | 131 | 126 | 24.2 | 36.2 | 597.1 | 2.2 |
| 11/9/76 | II-7 | 1215 | 2 | 5.1, 2.8 | 183 | 178 | 24.1 | 36.1 | 945.2 | 3.9 |
| 11/6/77 | II-1 | 0820 | 0 | ---- | 22 | 17 | 24.1 | 35.0 | 131.7 | ---- |
| 11/5/77 | II-4 | 0940 | 1 | 3.2 | 34 | 29 | 24.8 | 35.3 | 265.4 | 1.3 |
| 11/5/77 | II-2 | 1140 | 3 | 7.7, 4.0, 3.7 | 49 | 44 | 26.1 | 36.5 | 409.1 | 3.6 |
| 11/5/77 | II-5 | 1343 | 9 | 4.5, 4.9, 3.6 3.8, 4.4, 3.4 3.4, 3.4, 3.3 | 78 | 73 | 26.3 | 36.4 | 616.7 | 11.4 |
| 11/5/77 | II-6 | 1520 | 0 | ---- | 98 | 93 | 26.4 | 36.5 | 645.6 | ---- |
| 11/5/77 | II-3 | 1818 | 0 | ---- | 131 | 126 | 26.4 | 36.6 | 978.4 | ---- |
| 11/5/77 | II-7 | 1850 | 0 | ---- | 183 | 178 | 26.3 | 36.5 | 1,050.9 | ---- |

of the United States (Norcross *et al.* 1974).

Only spring and summer spawning has been found along the eastern U. S. (Wilk 1977), but spawning seems to occur widely in the fall in the northern Gulf. We collected larvae during November in the present study. Ripe-running bluefish males have been observed by one of the authors during October on the east side of Egmont Channel, in Tampa Bay, FL and ripe females have been captured off Panama City, FL in the fall. A spring spawning or an earlier position of a protracted spawn apparently also occurs in the Gulf as indicated by ripe-running males as well as both ripe and spent females caught by anglers near the oil rigs off Empire, LA in April 1978 (H. A. Brusher, pers. communication).

Bluefish larvae have not been collected before this study probably because of a lack of systematic or prolonged sampling over the outer shelf. Additional studies on the eggs and larvae of the bluefish are needed to understand that phase of the bluefish life history in the Gulf of Mexico.

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